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D-SAFIRE Federation Object Model

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July 2001

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1. Introduction

This document is the Federation Object Model (FOM) specification for D-SAFIRE. It also includes a discussion of the changes required in SAFIRE and some known problems to investigate for a High Level Architecture (HLA) implementation of SAFIRE. This implementation is called Distributed SAFIRE, or D-SAFIRE .

1.1 SAFIRE

SAFIRE is a detailed radar modeling software for the air-to-air modes of an airborne intercept radar, specifically the APG-65 on the CF-18. SAFIRE currently consists of two primary modules, the scientific simulation software (SSS) and the graphical user interface (GUI). The SSS is written in FORTRAN and the GUI has been developed using custom software in C and the Common Desktop Environment (CDE), a MOTIF based development environment that generates C code.

The SAFIRE program now includes a number of search and track modes. The search modes include velocity search (VS) and both high and medium PRF of Range-While-Search (RWS) and Track-While-Scan (TWS). The track modes include monopulse track for HPRF Single Target Track (H-STT) and MPRF Single Target Track (M-STT). SAFIRE also contains a number of generic ECM techniques that can be used to simulate various threats such as repeater jammers and smart-noise jammers. SAFIRE must be modified to operate with a distributed mission simulation. These modifications include the addition of communication modules to permit the mission scenario information to be exchanged and the optimization of the software to permit more reasonable response times.

1.2 High Level Architecture

HLA (High Level Architecture) is a standard developed by the U.S. Department of Defence (DoD) to facilitate inter-operability of different simulations. The HLA specifies a model template and interfaces and requires that inter-simulation interactions use a standard application programmer's interface (API).

1.3 D-SAFIRE

The primary drive for integration of SAFIRE with HLA protocols (D-SAFIRE) is radar support in the Air Crewstation Demonstrator (ACD). The ACD simulates the environment of the CF-18 cockpit. One aspect of development of the ACD is to configure it to utilize the SAFIRE radar model using HLA protocols. The ACD comprises aircraft and mission simulation components and includes flight models and terrain models. A current application of the ACD is human factors investigation for improved situation awareness display including radar information. SAFIRE will be added to provide realistic radar detections for cockpit display.

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The scope of the initial D-SAFIRE implementation with the ACD is limited to a subset of air-to-air modes (MRWS and MTWS) and at most two processed targets. Two processed targets includes any number of targets (or false targets) where at most two are visible at any iteration of a SAFIRE coherent processing interval (CPI). When referencing the radar model only, SAFIRE will be used, while D-SAFIRE will refer to the HLA/SAFIRE combination.

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2. D-SAFIRE HLA Federated Object Model

What follows is an outline of the FOM for an initial design of D-SAFIRE. The following tables and comments use the specifications for the FOM in the High-Level Architecture Object Model Template Specification [1].

Table 1: Object Model Identification Table

Object Model Identification Table	
Category	Information
Name	D-SAFIRE FOM
Version	1
Date	12 March 2001
Purpose	To simulate an APG-65 radar for an Aircrew Demonstrator
Application Domain	CF-18 flight simulations
Sponsor	DREO
POC	Mr. Gary Geling
POC Organization	DREO
POC Telephone	(613) 998 2063
POC E-mail	gary.geling@dreo.dnd.ca

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2.1 Object Class Structure

Table 2: Object Class Structure Table

Object Class Structure Table
Ownship Aircraft (PS)
Radar Sensor (PS)

Note:
P - (publishable) The object class can be published by a federate.
S - (subscribable) A federate is capable of utilizing (reacting) to the object class.

The Ownship Aircraft will be the source for user input and control and will create and modify the Radar Sensor as requested. The ACD simulation environment (through STAGE) will generate real target input for the Radar Sensor. The Radar Sensor will then supply the detected target information to Ownship Aircraft, which will be displayed on the cockpit radar.

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2.2 Interaction Class Structure

Table 3: Interaction Class Structure Table

Interaction Class Structure Table		
	Ownship Aircraft	Radar Sensor
Terminate Simulation	I	R
Create Radar Object	IR	IR
Destroy Radar Object	IR	IR
Radar Pause Request	IR	IR
Radar Continue Request	IR	IR
Update Aircraft	I	R
Update Target Processing List	I	R
Radar Parameters	IR	IR
Radar Status Report	R	I

Note:
I - (Initiate) A federate is capable of sending interactions of this type.
S - (Sense) A federate is capable of subscribing to the interaction.
R - (React) A federate is capable of subscribing and reacting to the interaction.

Ownship Aircraft will initiate all actions for the radar sensor to which the radar sensor will respond. Create Radar Object will start and initialize the D-SAFIRE model. The Destroy Radar Object will terminate the current D-SAFIRE model. Terminate Simulation signals SAFIRE to halt operation completely and shut down. The Radar Pause and Continue Requests control execution of D-SAFIRE, and will be used for debugging and any necessary synchronization or reconfiguration handling. The Update Target Processing List and Update Aircraft will be the motion model input to D-SAFIRE. D-SAFIRE will not use SAFIRE's motion model (profile generator) for internal operation but will receive updates of own ship and target motion during a coherent processing interval (CPI) by the ACD simulation environment. A Radar parameter interaction can only be communicated between the Ownship Aircraft and the Radar Sensor which it created. The Radar Parameter interaction from the Ownship Aircraft will be handled by SAFIRE the next CPI of the radar simulation. A requested change, if successful or not, will be evident in the next Radar Parameter interaction from the radar sensor. Any change the radar makes to its state is reported in the Radar Parameter interaction. The Radar Status Report contains all current hit information.

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2.3 Object Attributes

The Ownship Aircraft object attributes provide kinematic and Ownship Aircraft weapon configurations. The TSPI (Time-Space Position Indication) attribute is that used in the DMAWS report [2] for Ownship Aircraft. The weapons configuration of the Ownship Aircraft is used for selection of certain operations of the local radar.

The Radar Sensor holds the current radar parameters such as waveform (VS, HRWS, MRWS, HTWS, MTWS, ACQ1, ACQ2, HSTT, MSTT), scan volume (azimuth centre, azimuth span, elevation centre, number of bars), target aging, radar sensitivity and antenna position (used to indicate platform relative, horizontally stabilized antenna position for azimuth and elevation). The radar status is a list of the information extracted by the radar on all detected targets. The list includes raw hits, track files, noise targets and target parameters (range, closing velocity, azimuth, elevation). Note that depending on the mode, some of the values could have an undefined value. The target processing list is a list of all targets within the simulation, those within the scan volume are labeled visible. The TSPI, EM and ECM configuration must be maintained and updated.

Apart from the Ownship Aircraft, the Radar Sensor receives target information from the ACD Simulation Environment. This environment is not technically part of the Ownship Aircraft object, but exists alongside to generate the targets. The target information includes position information relative to the Ownship Aircraft, electronic countermeasures (ECM), electromagnetic (EM) characteristics, visibility and identification. The ECM configuration is used to initialize the ECM/jammer parameters of each target. The EM characteristics are used to indicate aircraft RCS and scintillation parameters (Swerling 0/I/II) for input to the radar return. The target information also indicates which target(s) is(are) in the field of view of the radar. All targets are maintained so a jammer history can be simulated without incurring the overhead of attempting to calculate the return from the target. The Simulation environment may also describe airborne material such as a chaff cloud that might be simulated by a large RCS object with rapid deceleration to zero velocity, but would not have ECM attributes.

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Object Attribute Table

Object	Attribute	Data Type	Cardinality	Units	Resolution	Accuracy	Accuracy condition	Update Type	Update Condition	T/A	U/R	R/S
Ownship Aircraft	TSPI	SAFIRE_TSPI_s	1	N/A	N/A	N/A	N/A	P	30 Hz	N	UR	N/A
	Weapons Configuration	wpn_cnf	1	N/A	N/A	N/A	N/A	C	user	N	UR	N/A
Radar Sensor	Radar Parameters	rdr_prm	1	N/A	N/A	N/A	N/A	C	user, radar	N	UR	N/A
	Radar Status	rdr_sts	1	N/A	N/A	N/A	N/A	P	CPI	N	UR	N/A
	Target Processing List	trg_prl	1	N/A	N/A	N/A	N/A	P	30 Hz	N	UR	N/A

note
P - (periodic)
C - (conditional)

Table 4: Object Attribute Table

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2.4 Interaction parameters

Create Radar Object is used by the Ownship Aircraft object to create an instance of the radar sensor object and a link to D-SAFIRE. At radar creation the initial radar mode is selected, all radar parameter attributes are initialized and the radar status and target processing lists are initialized empty. SAFIRE will initialize using the current loading procedure. Therefore all radar specific parameters will be entered from the sim_init.dat file which will be configured by the radar simulation operator. Once the radar simulation is loaded and initialized, the SAFIRE program will allow re-initialization of the radar modes using the radar parameter change interaction. Simulation will only begin once a radar start request has been received.

Destroy Radar Object removes the instance of the radar and severs the connection to D-SAFIRE. Terminate Simulation signals to terminate the D-SAFIRE simulation and shutdown the SAFIRE program.

Radar Pause and Continue Requests are used to pause and continue the current radar simulation. These can be used for timing synchronization and are convenient for debugging.

Update Target Processing List and Update Aircraft are used by the ACD to deliver new position and configuration changes to D-SAFIRE. Position information is updated periodically and parameters such as weapon configuration, EM and ECM characteristics and visibility are updated as changes occur.

The Radar Status Report outputs the complete list of radar detections (rdr_sts), for the previous coherent processing interval (cpi), to the Ownship Aircraft. The Radar Status Report is also used to send the track information while in MTWS mode. The track information will be sent at an update rate of 30Hz.

Radar Parameters is used by the radar or Ownship Aircraft object to indicate a change or requested change in radar parameters. Changes may include mode change (VS, HRWS, MRWS, HTWS, MTWS, RTS-HRWS, RTS-MRWS, AACQ, MACQ (MACQ request must also include the centre position of the TDC (azimuth and range/velocity) and either current scale, or desired acquisition window)), mode modify (NBAR, azimuth centre, azimuth span, elevation centre) and antenna position. A successful acquisition will automatically proceed to STT upon successful AACQ or MACQ. RTS shall return to last search mode before STT, RTWS returns to TWS with same PRF class, high or medium, as last search.

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Interaction Parameter Table

Interaction	Parameter	Data Type	Cardinality	Units	Resolution	Accuracy	Accuracy Condition	Routing Space
Terminate Simulation	SAFIRE_terminate	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Create Radar Object	SAFIRE_execute	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Destroy Radar Object	SAFIRE_exit	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Radar Pause Request	SAFIRE_pause	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Radar Continue Request	SAFIRE_continue	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Update Target Processing List	trg_prl	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Update Aircraft	Aircraft	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Radar Parameters	rdr_prm	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Radar Status Report	rdr_sts	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 5: Interaction Parameter Table

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2.5 Compound Data Types

Table 6: Compound Data Type Table

Compound Data Type Table								
Compound Data Type	Field		Data Type	Cardinality	Units	Resolution	Accuracy[1]	Accuracy Condition
Aircraft	sequence_number		int	1	N/A	int	perfect	always
	TSPI[2]	ACD[3]	SAFIRE_TSPI_s	1	N/A	N/A	N/A	N/A
	wpn_cnf	mc_wpn_selected	enum[4]	1	N/A	N/A	N/A	N/A
rdr_prm	radar_mode_ind		enum	1	N/A	N/A	N/A	N/A
	radar_numbar		int	1	bars	N/A	perfect	always
	radar_az_center		float	1	rad	float	perfect	always
	radar_el_center		float	1	rad	float	perfect	always
	radar_del_az		float	1	rad	float	perfect	always
	radar_acq_ind		boolean	1	N/A	N/A	N/A	N/A
	TAGC		float	1	dB	float	perfect	always
	acq_bump		boolean	1	N/A	N/A	N/A	N/A
	acq_az		float	1	rad	float	perfect	always
	acq_el		float	1	rad	float	perfect	always
	acq_vel		float	1	m/s	float	perfect	always
	acq_range		float	1	m	float	perfect	always

[1] Accuracy and Accuracy Condition fields are representative of the internal variables containing simulation status. They do not reflect the inherent accuracy of the model

[2] The TSPI information will be interpreted by the SAFIRE HLA modules for input to the SAFIRE SSS variables such as ownship_lat, ownship_long, ownship_alt, ownship_vn, ownship_ve, ownship_vd, ownship_an, ownship_ae, ownship_ad, target(x)_lat, target(x)_long, target(x)_alt, target(x)_vn, target(x)_ve, target(x)_vd, target(x)_an, target(x)_ae, target(x)_vd Each target must be uniquely labelled to identify the object being reported.

[3] DMAWS[2]

[4] As per the RTI standard, *enum* variables are contained in separate Enumeration tables

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	acq_scale	rdelta	float	1	m	float	perfect	always
		vdelta	float	1	m/s	float	perfect	always
	radar_az		float	1	rad	float	perfect	always
	radar_el		float	1	rad	float	perfect	always
rdr_sts	hit_info_number_of_hits		int	1	hits	int	perfect	always
	hit_info(1)_range		float	1+	m	float	perfect	always
	hit_info(1)_vel		float	1+	m/s	float	perfect	always
	hit_info(1)_hit_type		enum	1+	N/A	N/A	N/A	N/A
	hit_info(1)_azimuth		float	1+	rad	float	perfect	always
	hit_info(1)_elevation		float	1+	rad	float	perfect	always
	hit_info(1)_track_quality		int	1+	N/A	int	perfect	always
	hit_info(1)_estimated_Target_ID[5]		int	1+	N/A	N/A	N/A	N/A
target_list	sequence_number		int	1	N/A	int	perfect	always
	number_of_targets		int	1	N/A	int	perfect	always
	targets		target_array	1	N/A	N/A	perfect	always
target_array[6]	target[1[7]]		target_status	1+	N/A	N/A	perfect	alwyas
target_status	ID		int	1	N/A	N/A	N/A	N/A
	visible		boolean	1	N/A	N/A	N/A	N/A
	ecm_cnf	jammer_on	boolean	1	N/A	N/A	N/A	N/A
	em_cnf	target_rho_magnitude	float	1	m^2	float	perfect	always
		target_rcs_model	enum	1	N/A	N/A	N/A	N/A

[5]This will be -1 if no target could be matched to the hit

[6]In SAFIRE, the number of targets is limited to 10

[7]The current implementation limits the number of elements in the array to 2

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	range	float	1	m	float	perfect	always
	radial velocity	float	1	m/s	float	perfect	always
	radial acceleration	float	1	m/s^2	N/A	N/A	N/A
	az	float	1	rad	float	perfect	always
	el	float	1	rad	float	perfect	always
SAFIRE_TSPI_s	position	ALLVector_s	1	N/A	N/A	perfect	always
	velocity	NEDVector_s	1	N/A	N/A	perfect	always
	acceleration	NEDVector_s	1	N/A	N/A	perfect	always
ALLVector_s	altitude	float	1	m	float	perfect	always
	latitude	float	1	rad.	float	perfect	always
	longitude	float	1	rad.	float	perfect	always
NEDVector_s	north	float	1	m	float	perfect	always
	east	float	1	m	float	perfect	always
	down	float	1	m	float	perfect	always

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2.6 Enumerated Data Types

The following table lists the integer representations of the enumerations data types.

Table 7: Enumerated Datatype Table

Enumerated Datatype Table		
Identifier	Enumerator	Representation
mc_wpn_selected	GUN	1
	AIM7F	2
	AIM7M	3
	AIM9L	4
	AIM9M	5
radar_mode_ind	VS_MODE	0
	RWS_HPRF_MODE	1
	RWS_MPRF_MODE	2
	TWS_MODE	3
	RWS_INT_MODE (not supp)	4
	STT_MODE	5
	NO_MODE	6
Hit_info_hit_type[8]	REGULAR	0
	NOISE	1
	TWS__LS	2
	TWS_R1	3
	TWS_R2	4
	TWS_R3	5
	TWS_R4	6
	TWS_R5	7
	TWS_R6	8

[8]Currently supports REGULAR, NOISE and all TWS hits, will support other modes at a later date

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	TWS_R7	9
	TWS_R8	10
	TWS_R9	11
	TWS_GENERAL	12
	STT_REGULAR	13
	STT_ANGLE_ONLY_TRACK	14
target_rcs_model	CONSTANT	0
	SWERLING_MODEL_1	1
	SWERLING_MODEL_2	2

2.7 FOM Lexicon

This section exists to gain an understanding of the semantics of the data contained within the FOM.

Table 8: Object Class Definitions

Object Class Definitions	
Term	Definition
Ownship Aircraft (PS)	The CF-18 being simulated by the ACD
Radar Sensor (PS)	The APG-65 radar of the CF-18 being simulated by SAFIRE

Table 9: Interaction Classes

Interaction Class Definitions	
Interaction	Definition
Terminate Simulation	Signals the Radar Object to terminate
Create Radar Object	Signals the Radar Object to create a new SAFIRE simulation
Destroy Radar Object	Signals the Radar Object to destroy the current SAFIRE simulation
Radar Pause Request	Signals the Radar Object to pause the current SAFIRE simulation
Radar Continue Request	Signals the Radar Object to resume the paused SAFIRE simulation

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Update Target Processing List	Passes new target processing list information such as position, ECM and EM characteristics
Update Aircraft	Passes new aircraft information, such as position and weapon configuration
Radar Parameters	Requests the radar configuration to be changed (Ownship Aircraft) or indicates a change (Radar Sensor)
Radar Status Report	Passes the new hit list

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Table 10: Interaction parameters

Interaction Parameter Definitions		
Interaction	Interaction Parameter	Definition
Terminate Simulation	SAFIRE_terminate	Member function of Terminate Simulation interaction
Create Radar Object	SAFIRE_execute	Member function of Create Radar Object
Destroy Radar Object	SAFIRE_exit	Member function of Destroy Radar Object
Radar Pause Request	SAFIRE_pause	Member function of Radar Pause Request
Radar Continue Request	SAFIRE_continue	Member function of Radar Continue Request
Update Target Processing List	trg_prl	Compound data type holding the target processing list
Update Aircraft	Aircraft	Compound data type holding the aircraft state (position, weapon configuration)
Radar Parameters	rdr_prm	Compound data type holding the current state of the radar object
Radar Status Report	rdr_sts	Compound data type holding the hit information returned by the radar object (calculated by SAFIRE)

Table 11: Compound data

Parameter Definitions			
Compound Data Type	Field		Definition
Aircraft	sequence_number		Uniquely identifies and orders the updates
	TSPI	ACD	Time Space Position Indicator; defined for the simulation
	wpn_cnf	mc_wpn_selected	Indicates which weapon is selected
rdr_prm	radar_mode_ind		Indicates mode of radar
	radar_numbar		Number of scan bars in search pattern

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	radar_az_center		Current azimuth center of search pattern
	radar_el_center		Current elevation center of search pattern
	radar_del_az		Current half-width of search pattern
	radar_acq_ind		Indicates radar sub-mode acquisition
	TAGC		Total automatic gain control
	acq_bump		STT target re-selection indicator
	acq_az		Acquisition center azimuth search volume
	acq_el		Acquisition center elevation search volume
	acq_vel		Acquisition center velocity search volume
	acq_range		Acquisition center range search volume
	acq_scale	rdelta	Acquisition range extent parameter
		vdelta	Acquisition velocity extent parameter
	radar_az		Current antenna azimuth position relative to ownship heading
	radar_el		Current antenna elevation position relative to ownship heading
rdr_sts	hit_info_number_of_hits		Number of hits detected by the radar
	hit_info(i)_range		Range of the i^{th} detected hit
	hit_info(i)_vel		Velocity of the i^{th} detected hit
	hit_info(i)_hit_type		Type of the i^{th} detected hit
	hit_info(i)_azimuth		Azimuth of the i^{th} detected hit
	hit_info(i)_elevation		Elevation of the i^{th} detected hit
	hit_info(i)_track_quality		Quality of the i^{th} track file: 0- unconfirmed, 1 - confirmed, 2 - outside antenna scan range, 3 - soon do be deleted
	hit_info(i)_estimated_Target_ID		An estimation of which target generated this detection in the radar, -1 if no match

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trg_prl	sequence_number		Uniquely identifies and orders the updates
	number_of_targets		Number of targets included in the update
	targets		An array of updated target status
target_status_array	target[i]		The status of the i^{th} target in the array
target_status	ID		True target ID
	visible		Indicates if target is visible to radar
	ecm_cnf	jammer_on	True target electronic countermeasures indicator
	em_cnf	target_rho_magnitude	True target effective radar cross-section
		target_rcs_model	Model of electromagnetic properties of true target
	range		Range of true target
	radial velocity		Velocity of true target
	radial acceleration		Radial acceleration of true target
	az		Azimuth of true target
	el		Elevation of true target
SAFIRE_TSPI_s	position		Position in altitude, latitude and longitude
	velocity		Velocity in north, east and down coordinates
	acceleration		Acceleration in north, east and down coordinates
ALLVector_s	altitude		Altitude above ground in meters
	latitude		Latitude in radians
	longitude		Longitude in radians
NEDVector_s	north		North component
	east		East component
	down		Down component

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Table 12: Enumerated data

Enumerated Datatype Definitions		
Identifier	Enumerator	Definition
mc_wpn_selected	GUN	
	AIM7F	
	AIM7M	
	AIM9L	
	AIM9M	
radar_mode_ind	VS_MODE	Velocity search mode
	RWS_HPRF_MODE	Range-while-search high pulse repetition frequency mode
	RWS_MPRF_MODE	Range-while-search medium pulse repetition frequency mode
	RWS_INT_MODE (not supp.)	Range-while-search interleaved mode
	TWS_MODE (not supp.)	Track-while-scan mode
	STT_MODE	Single-target-track mode
	NO_MODE	No mode selected (default value)
Hit_info_hit_type	REGULAR	Standard hit
	NOISE	Noise detected at Az and El location
	TWS_LS	Track While Scan Launch and Steer target
	TWS_R1	Track While Scan hit - rank 1
	TWS_R2	Track While Scan hit - rank 2
	TWS_R3	Track While Scan hit - rank 3
	TWS_R4	Track While Scan hit - rank 4
	TWS_R5	Track While Scan hit - rank 5
	TWS_R6	Track While Scan hit - rank 6

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	TWS_R7	Track While Scan hit - rank 7
	TWS_R8	Track While Scan hit - rank 8
	TWS_R9	Track While Scan hit - rank 9
	TWS_GENERAL	Track While Scan hit
	STT_REGULAR	STT target
	STT_ANGLE_ONLY_TRACK	STT target with no range or velocity information
target_rcs_model	CONSTANT	Rcs does not fluctuate
	SWERLING_MODEL_1	Rcs fluctuates according to Swerling Model 1
	SWERLING_MODEL_2	Rcs fluctuates according to Swerling Model 1

2.8 Routing Space

The Routing Space Table is required in the FOM specification, but has no entries since data delivery is not limited to any subset of object classes.

Routing Space Table
N/A

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3. Known HLA Changes Required for SAFIRE

The current simple profile generator[9] used in SAFIRE will no longer be used. Ownship Aircraft (ownship) and targets are now updated through the ACD simulation environment. The ACD will frequently publish Ownship Aircraft and real target data, and D-SAFIRE will use only the most recent data for the current CPI.

The D-SAFIRE will also be required to set appropriate 'new_indicators' flags and supporting variables in SAFIRE when there is a radar parameter change action. This will require setting variables as input to subroutine user_input located in file user_input.f .

The ECM facilities will be configured by the SAFIRE initialization on creation and only selectable as on or off to the ACD.

SAFIRE has not been tested thoroughly for exact reproduction of a simulation on reset. Additionally, SAFIRE is completely untested for runs greater than a few minutes of simulation time. By exiting rather than resetting SAFIRE these types of problems can be corrected with a terminate simulation and create commands when detected.

When the GUI is active the Start, Stop and Step buttons will remain active. This will allow some local control for debugging and display purposes. The function of the Start and Stop buttons are duplicated in the Radar_Object, which handles the interface with the RTI modules. This allows the D-SAFIRE be remotely controlled. Much of the radar parameter input through the GUI will be disabled while running in D-SAFIRE mode, but will be accessible when running in stand-alone mode.

More details are available in the Preliminary Software Design Document [3].

[9]Subroutine profile_generator is located in file rsg f of SAFIRE.

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References

[1] High-Level Architecture Object Model Template Specification Version 1.3
U.S. Department of Defence
February 1998

[2] Distributed MAWS Engagement Program Summary Report
Canadian Marconi Company
Document number 1000-1186
March 1999

[3] Preliminary Software Design Document
Vantage point international
November 2000

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This document is the Federation Object Model (FOM) specification for D-SAFIRE. It also includes a discussion of the changes required in SAFIRE and some known problems to investigate for a High Level Architecture (HLA) implementation of SAFIRE. This implementation is called Distributed SAFIRE, or D-SAFIRE .SAFIRE is a detailed radar modeling program for the air-to-air modes of an airborne intercept radar, specifically the APG-65 on the CF-18.

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